

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

Claim 1 (canceled).

2. (original): An automotive engine control apparatus for controlling an automotive engine equipped with injection coils capable of driving fuel injection electromagnetic valves with respect to the respective cylinders of a multi-cylinder engine, and ignition apparatus provided with the respective cylinders, for performing ignition operations with respect to injected fuel, wherein:

each of said cylinders composes a cylinder group in conjunction with another cylinder thereof, the injection timing of which is separated by even-numbered timing from the injection timing of the first-mentioned cylinder; and

said automotive engine control apparatus is comprised of:

control means for controlling an internal operation of the automotive engine control apparatus;

a first switch element for sequentially driving said respective injection coils in response to a pulse series of an ignition drive signal generated by said control means;

a first detection circuit for detecting that at least said injection coils are turned ON/OFF;

first abnormal state judging means for comparing a detection signal derived from said first detection circuit with said injection drive signal to judge whether or not said injection coils are operated under the normal state with respect to each of said cylinders;

first abnormal state storage means for storing there into a judgment result obtained by said first abnormal state judging means with respect to each of said cylinders;

a second switch element for sequentially driving said respective ignition apparatus in response to a pulse series of an ignition drive signal generated by said control means;

a second detection circuit for detecting that at least said respective ignition apparatus are turned ON/OFF;

second abnormal state judging means for comparing a detection signal derived from said second detection circuit with said ignition drive signal to judge whether or not the ignition apparatus is operated under the normal state with respect to each of said cylinders;

second abnormal state storage means for storing there into a judgment result obtained by said second abnormal state judging means with respect to each of said cylinders; and

cylinder group drive stopping means for stopping both fuel injection operations and ignition drive operations related to a cylinder operated under the abnormal state which is stored into any one of said first and second abnormal state storage means, and also related to all of other cylinders which compose a cylinder group in conjunction with said cylinder operated under the abnormal state.

3. (original): An automotive engine control apparatus as claimed in claim 2, further comprising:

recovery means for causing both the fuel injection operation and the ignition drive operation to become active with respect to a cylinder whose information is not stored in said first and second abnormal state storage means in the case where the drive operations of plural cylinder groups are stopped by said cylinder group drive stopping means.

4. (original): An automotive engine control apparatus as claimed in claim 2, further comprising:

interconnection storage prohibiting means which prohibits, in the case where any one of said first and second abnormal state storage means stores there into the judgment result of said cylinder operated under the abnormal state, such operations that the other of said first and second abnormal state storage means stores there into said judgment result, and also prohibits judgment results related to all of other cylinders which compose a cylinder group in conjunction with said cylinder operated under the abnormal state from being stored into both said first and second abnormal state storage means.

5. (currently amended): An automotive engine control apparatus as claimed in claim 42 wherein:

 said first detection circuit comprises an off-surge voltage detection circuit used for said first switch element provided with respect to said injection coils; and

 said detection signal is supplied to said control means via an OR-gate circuit employed between said off-surge voltage detection circuit and said control means.

6. (currently amended): An automotive engine control apparatus as claimed in claim 42 wherein:

 each of said ignition apparatuses includes an ignition primary coil;

 said second detection circuit is an off-surge voltage detection circuit for detecting a current interrupt of said ignition primary coils; and

 said detection signal is supplied to said control means via an OR-gate circuit provided between said off-surge voltage detection circuit and said control means.

7. (currently amended): An automotive engine control apparatus as claimed in claim 42 wherein:

 each of said ignition apparatuses includes an ignition secondary coil;

 said second detection circuit is a discharge current detection circuit for detecting a discharge current of said ignition secondary coils; and

 said detection signal is supplied to said control means via an OR-gate circuit provided between said discharge current detection circuit and said control means.

8. (currently amended): An automotive engine control apparatus as claimed in claim 42, further comprising:

 a warning/display apparatus for notifying the abnormal state in the case where any one of said first abnormal state storage means and said second abnormal state storage means stores there into the judgment result of said cylinder operated under the abnormal state.

9. (previously presented): An automotive engine control apparatus as claimed in claim 8, further comprising:

warning/display synthesizing means for issuing such a notification that an abnormal state has occurred without discriminating a cause of the abnormal state of an injection system, an ignition system, and a cylinder system where any one of said first and second abnormal state storage means stores there into the judgment result of said cylinder operated under the abnormal state; and

wherein said warning/display apparatus is operated in response to a signal supplied from said warning/display synthesizing means.

10. (currently amended): An automotive engine control apparatus as claimed in claim 4~~2~~, further comprising:

a communication interface circuit for communicating with a predetermined external tool provided outside of said automotive engine control apparatus;

display/transmission means for transmitting/displaying malfunction information to/on said external tool; and

reset means for initializing the storage contents of said first and second abnormal state storage means by means of said external tool.